Implicit attitudes in video gamers: an experimental study

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Abstract

Video games are a rapidly growing entertainment industry. Given their global popularity, it is important to investigate the effects of gaming on individuals. Past research has often relied on self-report measures to study players' explicitly stated beliefs about games. This study employs the novel Affect Misattribution Procedure (AMP) in a between-groups design. The AMP assesses implicit attitudes by examining participants' reactions to flashing images paired with a neutral stimulus. This study aims to firstly identify if gamers demonstrate a consistent bias for virtual stimuli compared to non-gamers, and secondly to identify if this bias for virtual stimuli correlates with: Gaming contingent self-worth, gaming motivation, and problem gaming. The AMP was paired with a survey administered online to recruit and gather data. The final sample consisted of 145 participants, including Gamers (N=90) and Non-Gamers (N=55). The results of the analyses indicated that there was a significant relationship between implicit bias, gaming motivation (escapism) and problem gaming, and genre preference might have an association with this relationship. The findings suggest that implicit biases may be an experimental route for understanding problem gaming, but the AMP needs to be further refined due to practical limitations in simulating virtual stimuli.

Declaration

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Implicit attitudes in video gamers: an experimental study

Video games have become a cornerstone of the modern entertainment industry and of people's everyday life. There are an estimated 1.23 billion people who play video games in the Asia Pacific region alone (Gough, 2019), and this number is growing every day as the video game industry continue to grow and reach into the more casual markets like Mobile, and also competitive scenes like Esports, which can receive upwards of 99.6 million viewers (Goslin, 2018). Despite their social significance it is still not fully known why people are drawn to video games over other forms entertainment and hobbies, and why some of these people develop problem gaming tendencies that severely diminish multiple areas of their lives. This is to say the very motivations for playing video games and what they are, and if some are more likely to lead to problematic gaming tendencies are not fully known. Or even if it is possible that individuals could have an implicit bias or attitude that make them more drawn to games. To address this issue of problem gaming tendencies, which is characterised by persistent use of games and a detriment of one's health or other areas of an individual's life, the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) has included Internet Gaming Disorder (IGD) (American Psychiatric Association, 2013). This inclusion shows that gaming can lead to very serious conditions and that to help people who are afflicted we need to learn more about why people play video games and how these problematic gaming tendencies evolve and lead to functional impairment of some people's life.

1.1 Internet Gaming Disorder

Problem gaming has been recognized as a serious issue that has the potential to affect a large number of people, and as such it has been a focal point of study for the community. With the more consistent definition of what problem gaming and IGD is, that was provided by the DSM-5, Petry consulted a large number of experts from various countries to create an assessment of IGD that was formed from international consensus, allowing for it to incorporate different cultural values and thus have a larger range of application (Petry et al., 2014). This measure is composed of 9 subdomains, which are similar to domains in both substance and gambling addictions research and classification.

These domains are pre-occupation, withdrawal, tolerance, unsuccessful attempts to stop or reduce, loss of interest in other hobbies/activities, excessive gaming despite problem,

deception, escape or relief from a negative mood, and loss of relationships. This measure illustrates how similar gaming disorder is to disorders related to substance abuse; especially with the withdrawal domain, which refers to behavioural and physiological changes to a person when not engaging with the source of addiction. Also with tolerance , which refers to increasing of dosage or time spent on an activity for the individual to receive the desired effect, bot withdrawal and tolerance are studied and noted in research to do with substance abuse disorders/addictions (Emmett-Oglesby, Mathis, Moon, & Lal, 1990; Hasin, Paykin, Meydan, & Grant, 2000; Hughes & Hatsukami, 1986; Rozin & Stoess, 1993). Even with all this research, there is still debate over what exactly causes problematic gaming tendencies and functional impairment of the person's life. While addiction is a product of multiple variables that all culminate to result in an individual becoming addicted, research in gaming has focused on singular predictors and variables such as aggression without considering multiple variables (Kardefelt-Winther, 2014a; Ryding & Kaye, 2018).With the focus on single predictors and variables for problem gaming, these studies do not cover other details of the individual life that could cause problem gaming, as well as not exploring that idea that problem gaming could occur due to multiple factors that cause the individual to turn to gaming to deal with difficulties in their life (Kardefelt-Winther, 2014b; Pulos & Fisher, 1987).

1.2 Issues with current research

Some of the main issues with the current research in the field is the over-focusing on one individual predictor/characteristic, also a large amount of the research relies entirely on self-report. For example in earlier studies on the correlation of aggression and video games (Wiegman & van Schie, 1998), this study only took into account video game usage and prosocial and aggressive behaviour, this highlights some of the limitations of these earlier studies as the focus on the individual predictor or characteristic of the participant results in them forgoing other explanations for the participants antisocial behaviours such as anxiety or depression.

Another example of early research in the field of video games and their effects on individuals highlights yet another issue of the use of self-report measures (Chin-Sheng, 2006), this study had participant self-report the amount of time spent playing video games and their personal investment, this approach is limited as while in recent years attitudes about video games have started to shift to a more socially acceptable hobby, it used to be a socially

held belief that people who play video games are social outcast. Other limitations of self-report data are that participants can have issues recalling data, especially when recalling the how long they have played for, as some individuals can get wrapped up in playing and not notice how long they have played for. There is also an issue were individuals can tell researchers what they want to hear, or even report video games in a more positive light to try to improv video gaming's reputation. The limitations of self-report measures bring to question the validity of these older studies, as participants have reasonable reason to lie about video game usage. Despite these limitations, self-report measure have provided valuable information to the field of video game research, especially in the areas of gaming motivations which has to do with the reason for why people play video games, this is because it is easier to ascertain why people play video games when you can just ask them.

1.3 Gaming Motivation

Problem gaming tendencies seem to relate more to online gaming than to offline gaming, with typical media stories talk about problem gaming using online games such as 'Fortnite' or 'League of Legends'. This has led to many of the current assessments to have questions that are mainly directed to online games; Yee's Motivation of Play in Online Games (Yee, 2007) is one such measure, this measure has been shown to be cross-culturally valid (Yee, Ducheneaut, & Nelson, 2012) and has been accepted and used by other researchers in the field of video game research (Billieux et al., 2013; Hussain, Williams, & Griffiths, 2015; Lo, Lie, & Li, 2016; Yang & Huang, 2011). This measure was designed for online games, which are games that require an internet access and a usually played with other people or at least has a way to interact with them, while offline gaming refers to games that do not require internet connection and that the individual usually plays alone. This means that online games typically provide a wide range of interactive experiences thus giving individuals different sets of motivations.

Yee's Motivation of Play in Online Games has classified why people play video games into 10 subdomains that follow under 3 main domains, the 3 main domains are achievement, social, and immersion. The subdomains of achievement are advancement, which refers to the gamer's progression through the game and the status and power they hold in the game, mechanics, which refers to the mastery and skill of playing the game, and competition, which refers to challenging and dominating other players. The subdomains of social are socializing, which refers to helping others and making friends, relationships, which

refers to giving and receiving support, and teamwork, which refers to collaboration and group achievements. The subdomains of immersion are discovery, which refers to exploration and lore, role-playing, which refers to storyline and character history, customization, which refers to the extent of control the gamers have of their character or world, and escapism, which refers to relaxation and escaping/avoiding real-life (Yee, 2007). Yee provides a very comprehensive measure of motivation, however, the domain of immersion holds the most interest in research into problem gaming tendencies, as the subdomains of immersion, mostly escapism, is currently accepted in the literature as being one of the main factors in causing functional impairments on individuals, which characterise IGD. (American Psychiatric Association, 2013).

Escapism is currently one of the main focus of interest in the literature as it is a commonly held idea in society that people go online to escape from real-life issues and that individuals will even support this by saying that their online use is to deal with their dysphoric moods (Kardefelt-Winther, 2014a). This assumption is backed up by various studies that all find escapism to be a significant factor of people playing and becoming addicted to video games (Cade & Gates, 2017; Calleja, 2010; Reid, 2012). In recent studies escapism has been showed to be more complex of an idea than originally thought, as it can be both adaptive and maladaptive (Deleuze et al., 2019), and to a certain degree, it is possibly needed for an individual to fully engage and enjoy a game. This focus on escapism can be traced back to what is seen as the start of research into gaming and internet addiction, which proposed the idea that gaming addiction was an impulse-control disorder and that avoidance or escaping issues in one's life could play a role in that (Young, 1998). Youngs early work served as a foundation for future research into why people play video games, these studies explored various constructs that might predict problematic internet/gaming use, constructs such as self-esteem (Beard & Wickham, 2016; Fioravanti, Dèttore, & Casale, 2012), loneliness (Caplan, 2005), and other constructs.

However, looking and isolating single characteristics is limited as discussed early in this article, and once some of these constructs are controlled for, they start to lose significance (Kardefelt-Winther, 2014b) and with these constructs losing significance it has put emphasis in exploring the idea that gaming is more of a coping strategy (Kardefelt-Winther, 2014a).

1.4 Affect Misattribution Procedure

As it can be seen much of the founding and contemporary research in the field of video games relies heavily on the use self-report measures, However, in a recent study, there has been a push to start exploring experimental avenues of studying escapism and video games (Deleuze et al., 2019). In this study by Jory Deleuze, the Affect Misattribution Procedure (AMP) was used, the AMP is a measure of implicit attitudes, which are unconscious evaluations that an individual undertakes towards an object and are often shaped by various influences in the individual's life (Devos, 2008). The AMP measures implicit attitudes by priming a neutral stimulus with a stimulus of interest and having the participant judge the neutral stimulus as pleasant or unpleasant (Payne, Cheng, Govorun, & Stewart, 2005). The AMP was first made by Payne and colleges after they had wished to test a quantitative model they had made about how people correct their judgments for unwanted influences. This exercise was a self-described "failure"(Payne & Lundberg, 2014), but they noticed that the utility of the AMP in the measurement of implicit attitudes and biases, and throughout their initial trials they realised that the AMP addressed the reliability limitation that existing implicit measures faced (Payne & Lundberg, 2014).

The AMP is used to predict behaviour and has been used to study behaviour in a wide range of areas both reliably and with validity. For instance it has been shown to correctly predict voting behaviours in individuals (Greenwald, Smith, Sriram, Bar-Anan, & Nosek, 2009; Payne et al., 2005), it has also been shown to predict drinking in those with an implicit bias to alcohol (Payne, Govorun, & Arbuckle, 2008; Payne, Lee, Giletta, & Prinstein, 2016), along with other areas such as substance use (Robinson, 2018), Moral Decisions (Hofmann & Baumert, 2010), and prejudice effects (Teige-Mocigemba, Becker, Sherman, Reichardt, & Klauer, 2017). The findings from the AMP are most likely to be due to misattribution as it has been found that the priming effects depends on the subjects' evaluations of the neutral stimulus and the stimulus of interest (Payne et al., 2013), and this misattribution has to do with the semantic concept of the stimulus of interest. This misattribution of semantic concept means that the individual will unconsciously have their feelings and thoughts of the priming stimulus affect there evaluation and decision of the neutral stimulus, for example, it has been shown that using an angry face for priming, misattributes the concept of angry to the neutral stimulus (Payne & Lundberg, 2014).

Based on the previous findings of the AMP, the AMP could also be applied to other purposeful behaviours such as playing video games. It is possible that the AMP will be able to be used to predict escapism behaviour and therefore be able to predict problematic gaming behaviour. This is to say that if there is a correlation between a preference for virtual stimuli and escapism, the AMP could be used as an experimental measures, that is not subject to self-report, in the study of why people play video games and the identification of individuals that are at risk for developing functional impairments in their daily lives. This provides an avenue of research and a tool that can be helpful in predicting the problem gaming tendencies of an individual which in the current literature of video games, researchers do not have and as such would possibly allow for a way to give legitimacy to IGD diagnosis in the eyes of the general public.

While the study conducted by Deleuze and colleagues found a correlation between escapism and implicit preference for virtual stimuli(Deleuze et al., 2019), in their application of the AMP, they utilised images from the same video game, 'World of Warcraft'. Using images from the same video game allowed for a better control over the content and similarity of the virtual stimuli while allowing for the participant to more easily subconsciously recognise what its virtual stimuli due to them having similar art styles, thus allowing for the brain to make the connections quicker (Mayford, Siegelbaum, & Kandel, 2012). However, this could also negatively affect the data that was gathered, 'World of Warcraft' is a game with a long history in which many participants possibly played several years ago, and this is where the issue might arise. The nostalgia that a participant might feel about the images from 'World of Warcraft' could be what is causing the positive feelings (Leboe & Ansons, 2006). This possible effect of nostalgia is something that Deleuze did not consider in his study, while Deleuze used images only from 'World of Warcraft', he did not check to see the participants past relationship with the game.

It is also possible that depression plays a role in video game motivation, with people developing functional impairments in their life due to playing video games to escape problem in their life, it may be important to control for depression as due to the symptoms of depression (WHO, 2017) it may affect the person implicit attitudes to stimuli. As the AMP takes a measure of the participants implicit attitudes and biases, a participant with depression can have a general dislike for the stimulus which can quite possibly cause the results of the AMP to be compromised and invalid. A 10-question scale referred to as the K10 provides a

short questionnaire to be used in various situations were brevity is needed, even though this scale is short it still has strong psychometric properties and has seen use by the World Health Organisation (WHO) mental health surveys (Kessler et al., 2002).

While escapism and other gaming motivation sub domains are prevalent in the literature due to having high consistent correlations with problem gaming(Kuss, Louws, & Wiers, 2012; Wei, Chen, Huang, & Bai, 2012), it is generally not taken into account the types of video games that people play, with these studies normally grouping every gamer into a singular group. Based on the idea of self-determination theory it is seen that for people to use video games as a form of escape, the game itself needs to satisfy basic psychological needs for competence, autonomy and relatedness(Przybylski, Rigby, & Ryan, 2010), that is to say that for a person to become addicted to a video game it needs to fill their own personal needs. It has also been shown in a more direct study that when controlling for individual genre preference different motivations become more significant (Hilgard, Engelhardt, & Bartholow, 2013). This would mean that similar to how past studies were looking at a singular predictive characteristic for problem gaming, which proved to be flawed and problematic, it is quite possible that viewing gamers as one homogenous group is also a flawed and problematic approach to studying video game motivation and problem gaming.

1.5 The Present Study

Video games are a large influence on the general populace as it makes up a large portion of the entertainment industry, seeing how this is the case there has been intensive research into the area of video games especially in the areas of motivation for playing video games. Past research has been limited due to self-report measures that have built the foundation of knowledge in the field but has some validity issues due to the fact of the social stigma that has historically surrounded video games and the societal pressure that puts onto an individual. Despite all this, self-report measures have produced measures that are reliable and valid, such as Yee's motivation in playing video games, which has been used to find that escapism correlates with problem gaming tendencies. However, these studies are limited as they do not consider individual preferences that might cause other gaming motivations to be significantly correlated to problem gaming. The AMP is a measure of implicit attitudes and bias, and possibly provides an avenue of experimental research into why people play video games and why some people develop problem gaming tendencies. If Gamers have this implicit bias for virtual stimuli we can expect that the will indulge in more video game usage

or at least be at a higher risk of developing dysfunctional behaviours (Payne et al., 2008). Also, if implicit bias shows to be a viable avenue of research this means that there will be a whole side of people that have not been able to be studied thoroughly by self-report measures that would now accessible to the research community.

Considering all of this, it is the aim of the current study to firstly see if gamers have a significant preference for virtual stimuli over real-life stimuli, this will be assessed utilizing the AMP. The second aim is of this study is to see if an increase in preference with virtual stimuli correlates with problem gaming and other prominent measures that measure why people play video games. The measures that will be used to test the validity of using implicit attitudes are Gaming Contingent Self-Worth, Yee's Motivation to Play in Online Games Questionnaire, and Petry's measure of IGD. The third aim is to investigate the role of genre preference on gaming motivation and preference for virtual stimuli. The overall aim of this study is to see if experimental means can be utilized in the field of problem gaming and gaming motivation, either as an eventual replacement of self-report measures or to at least act as supporting data to help deal with some of the validity problems that arise through the use of self-report measures that currently dominate the research area. Our first hypothesis is that gamers will have a significant preference for virtual stimuli and that this will be significantly different to non-gamers virtual preference. Our second hypothesis is that virtual preference will positively correlate with escapism, and our third hypothesis is that when controlling for genre preference other domains of gaming motivation will become significantly correlated.

2.0 Method

2.1 Participants

The participants were recruited from two separate sources, firstly the Adelaide University SONA Research Participation System (RPS) which recruited Adelaide University first-year students, secondly various Australia gaming forums, including Facebook groups and 'AusGamers'. Participants had the option to enter a raffle which offered a chance to win $50 (AUD) Steam gift card. The inclusion criteria of this study were participants being at least 18 years old, and a fluent English speaker. Due to the nature of the AMP, the participants also must not be fluent in Chinese as it would interfere with the use of Chinese pictograms as a neutral stimulus. There was a total of 262 response, which 145 responses were usable, the participants were split into two groups, the first one being our control group which consisted of Non-gamers, people who spend less than 1 hour a week playing videogames, n = 55 where 9 were male and 46 were female, mean age of 20.3 years . While the second group, consisted of Gamers, who spend 2 hours or more a week playing video games, n =90 where 46 were male, 41 were female, and 3 were other, with a mean age of 22.9 years.

2.2 Instruments (measures)

2.2.1 Affect Misattribution Procedure (AMP)

The AMP is a newer measure of implicit attitudes, where the participant is shown an image of interest, for normally 75ms, then shown a neutral stimulus, normally 125ms, and then presented a mask image where they are asked to rate the neutral stimulus as either 'pleasant' or 'unpleasant'. While following the guidelines and standards for the AMP certain changes were made to the task, this included adding a blank image between the image of interest and the neutral stimulus. Another modification to the task was the changing of 'pleasant' and 'unpleasant' to 'like' and 'dislike', this was done as it was thought that 'like', and 'dislike' would be more natural to an Australian sample. While previous studies on the topic of video games rely on self-report measures with the use of AMP, we can overcome the drawbacks of self-report measures.

2.2.2 Background/gaming activity/ genre preference

This part of the survey was to address socio-demographic variables, such as age, gender, ethnicity, where they live, as well their normal gaming activity and their video game genre preference. Their normal gaming activity serves to measure the participants engagement while their genre preference is taken because, even though it has been shown that escapism is the main relevant gaming motivation to Gamers overall, gamers are likely to have a relationship to the other subdomains of gaming motivation when you split the Gamer group into their genre preference (Hilgard et al., 2013).

2.2.3 Gaming contingent self- worth scale

The Gaming contingent self-worth task (GCSW) is a measure composed of 29 items that explores various domains related to gaming, these domains include social, competition, competence, virtue, character appearance, and items (Beard & Wickham, 2016).The GCSW has an overall composite Cronbach alpha of .94 and has strong intercorrelations with gaming motivations ranging from -0.31 to 0.76. The GSCW was originally developed by adapting existing measures of contingent self-worth as well as using interviews from MMORPG players. These items were then further adapted in this study to be more general allowing for players of other video-game genres to answer them. The GSCW uses a five-point Likert scale ranging from “Strongly Disagree” to “Strongly Agree” and the participants were asked to answer the questions based while considering their favourite games.

2.2.4 The Motivation to Play in Online Games Questionnaire (MPOGQ)

The motivation to play in online games questionnaire is a 39-item that consist of 10 subdomains which are Advancement, Mechanics, Competition, Socialising, Relationship, Teamwork, Discovery, Role-Playing, Customisation, and Escapism. All these subdomains had a Cronbach’s alpha of over .70 (Yee, 2007).

2.2.5 Internet Gaming Disorder (IGD) Checklist

The IGD Checklist was designed by various international experts from around the globe and headed by Petry, to form a concise and agreed upon-measure for assessing IGD in relation to the entry in DSM-5 (Petry et al., 2014). The measure consists of 9 yes or no questions based upon pre-occupation, withdrawal, tolerance, reduce/stop, giving up on other activities, continuation despite problems, deception, escape of adverse moods, and loss of

relationships. It has been shown that the IGD checklist has predictive validity but some of the criteria have presented with some issues, such as not representing what it's supposed to be measuring as strongly as other areas, and this shows that further refinement on certain measurements are still needed (Schivinski, Brzozowska-Woś, Buchanan, Griffiths, & Pontes, 2018).

2.2.6 Open-ended questions

The open-ended were optional question at the end of the survey that allowed for participants to offer any additional information that could provide some more insight into why they play video games and if their preference for stimuli was the same at a conscious level.

2.2.7 K-10

The K-10 measure of depression is a strict measure that consists of 10 questions and has seen precise results in the 90^{th} – 99^{th} percentile range of the population distribution, as well as wide use from governmental bodies, such as its inclusion in the 1997 Australian National Survey of Mental Health and Well-Being (Kessler et al., 2002).The K-10 has also been shown to have a high level of internal consistency, with a Cronbach's alpha of 0.88 (Sampasa-Kanyinga, Zamorski, & Colman, 2018). The inclusion of this measure is to see if depression has an effect on peoples 'like' and 'dislike' on the AMP.

2.3 Procedure

The study mainly took place on Survey Monkey however the AMP portion was unable to be integrated directly into Survey Monkey and as such had to be run externally from the Survey Monkey Website. The AMP does have a few online sources which allow for it to be run. However, these online sources require either a sign up to a service or require the participant to download a program to their computer. These two options were thought to be unsuitable due to the thought that downloading a program would be too off-putting to participants, so to create an AMP task online that was not through a service or requiring downloading a program, a website was programmed to run the task. To do this first a website was purchased and hosted through the company Square Space and then a program was made in JavaScript, JavaScript was chosen due to its easy integration onto the website and general ease of use. There were many iterations of the final code due to issues that were found, which

were due to inconsistent performance depending on the participants' computer and internet. The code functioned by having each image in its own function and the 'like' and 'dislike' buttons serving to not only record results but also switch between each function. Then by using 'setTimeout' and 'if' functions, the switching between the images based on the correct time intervals were achieved. The major change in this task is that the time intervals for images were increased, and even though changes of the intervals have been shown to be acceptable (Payne & Lundberg, 2014), the changes that had to be made to ensure that the task was more accessible and consistent were a lot more significant as they were set for 550ms for the image of interest, instead of the standard 75ms, and 650ms for the Chinese pictograph, instead of the standard 125m (Payne et al., 2005).

To build upon this issue of accessibility and consistencies, with the way the code is built it is important to load all the images in a global setting and not in each function as this will cause issues with the images loading and result in you having to extend the time intervals for the images even further. The final version of the AMP task consisted of 20 images total, 10 virtual images and 10 real-life images. The virtual images were taken from the top 10 bestselling video game in Australia during 2018 (Gritixi, 2019), they were chosen from this to avoid the confounding effect of nostalgia (Leboe & Ansons, 2006) while still being recognisable to as many people as possible. The real-life images were made up of images the resembled the virtual images as closely as possible. This number of images was decided upon as to reduce the total time need to complete the study as to incentivise more people to do it.

After completing the AMP portion, the participants were given a dummy code which consisted of random letters with the 'like' scores for the two categories of images located within it, the participants were then asked to enter this code on the SurveyMonkey website. This dummy code was used to minimise any cases of participants lying about their score. After entering the code, the participants could leave a comment on any issues that arose during the AMP portion and then they went on to answer a 15-minute survey which addressed socio-demographic variables, gaming habits and behaviours. At the end of the study, participants were able to enter their email addresses to enter a raffle for a $50 voucher, however, students of the University of Adelaide were unable to enter this as they were given equivalent class credit. The University of Adelaide School of Psychology human research ethics subcommittee approved the study. All information including the linking email addresses and student IDs, if chosen to be provided, was only available to the researcher and

supervisor, which after completion was deleted, only the results of the survey and task are kept on the Adelaide University server.

3.0 Results

3.1 Comparison between Gamers and Non-Gamers

An independent-samples t-test was conducted to compare participants virtual preference scores depending on if they were a Gamers or Non-gamers. These results are presented in Table 1. There was a statistically significant difference found between the scores for Gamers (M= .43, SD = 2.3) and Non-Gamers (M= -1.27, SD = 2.52) conditions; t (144) = 4.19, p <.001. Where a positive mean shows a preference for virtual stimuli and a negative mean shows a preference for real-life stimuli.

Table 1
Independent Samples Test Between Gamers and Non-Gamers regarding Virtual preference

		Levene's Test for Equality of Variances		T-test for Quality of Means					95 % Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Virtual Preference	Equal Variance assumed	.774	.380	4.186	144	.000	1.701	.406	.898	2.505
	Equal Variance not assumed			4.099	108.893	.000	1.701	.415	.879	2.524

Following this another independent-samples t-test was conducted to see if there were other variables that could explain this difference, namely gender and age, this result can be seen in Table 2. Firstly, there was a significant difference in the distribution of genders in Gamers (M= 1.52, SD= .565) and Non-gamers (M = 1.84, SD=.371); t(144) = -3.725, p < .001, which shows that Non-Gamers had a higher distribution of females, with Gamers coded as group 1 and Non-gamers as group 2. Secondly there was a significant difference in age in Gamers (M= 22.98, SD = 7.53) and Non-gamers (M = 20.3, SD = 4.23); t (144) =2.43, p= .01.

Table 2
Independent Samples Test Between Gamers and Non-Gamers regarding Gender and Age

		Levene's Test for Equality of Variances		T-test for Quality of Means					95 % Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Gender	Equal Variance assumed	55.137	.000	-3.725	144	.000	-.317	.085	-.485	-.149
	Equal Variance not assumed			-4.092	143.57	.000	-.317	.077	-.470	-.164
Age	Equal Variance assumed	8.421	.004	2.428	144	.016	2.674	1.101	.497	4.851
	Equal Variance not assumed			2.745	142.75	.007	2.674	.974	.748	4.6

3.2 Regression Analysis

One of our main focuses was seeing if the implicit preference given by the AMP significantly correlates with other known measures, particularly escapism and problem gaming. Table 3 shows the results of the bivariate correlation test the was run to compare virtual preference scores with demographic and gaming information (gender, age, hours spent gaming a week, and how long a normal gaming session is), the MPOGQ domains, contingent self-worth, K10, and the IGD checklist (problem gaming). From this table, we can see that there was a positive correlation between virtual preference and escapism, r = .29, n= 90, p=.005. There was also a positive correlation between virtual preference and problem gaming, r =.292, n=90, p=.005, and seeing how escapism has been closely correlated to problem gaming in previous studies the fact that they have similar correlation is to be

expected. After finding theses correlations a multiple linear regression was calculated to predict virtual preference based on escapism and problem gaming which can be seen in Table 4. A significant equation was found F (2, 87) = 5.56, p= .005, with an R^2 of .113. The participants' predicted virtual preference is equal to -1.88 + .227(problem gaming) + .164(escapism). virtual preference increased by .164 for each increase of escapism score and increased by .227 for each increase of problem gaming score. However, both escapism and problem gaming were not significant predictors of virtual preference.

Table 3
Correlation between Virtual Preference and the other study variables

Variable	Virtual Preference
Gender	-.038
Age	-.003
Hours/Week	.031
Gaming Session	.182
Advancement - MPOGQ	.065
Mechanics - MPOGQ	.155
Competition - MPOGQ	-.139
Socializing - MPOGQ	.057
Relationships - MPOGQ	.125
Teamwork - MPOGQ	.023
Discovery - MPOGQ	.004
Roleplaying - MPOGQ	.084
Customization - MPOGQ	.113
Escapism - MPOGQ	.294 **
Contingent Self Worth	.117
Problem Gaming	.292 **
K10	.061

Note. Gender = males coded as 1, females as 2; Hours/week = how long a week participants spend playing video games; MPOGQ = Motivation to Play in Online Games Questionnaire; * p<.05; ** p<.005

Table 4

Multiple regression analysis with Virtual preference as the dependent variable against Escapism and Problem Gaming.

Model	B	Standard Error	β	t
Escapism	.164	.099	.196	1.662
Problem gaming	.227	.140	.191	1.624

Note. * p<.05; ** p<.005; R^2 = .113 (p = .005)

After this, a partial correlation was run. It was found that when we control for escapism on the relationship between problem gaming and virtual preference, we get a partial correlation of r = .172, p= .108. It was also found that when controlling for problem gaming on the relationship between escapism and virtual preference, we get a partial correlation of r = .175, p =.100.

3.3 Comparison according to genre preference

To test if genre preference has an association on the other measurements of this study, the Gamer participants were split into groups based on the preference they listed, to ensure the largest samples were available the participants were first split based on their first preference. This identified Action, Adventure, and Role-playing as the 3 most common groups, however, Action and Adventure were then merged into a singular group due to their common themes and how they are often included as one genre in modern games, and then participants were placed into one of the three common groups based off their secondary and tertiary preferences. This resulted in the three common groups being Action/Adventure (N=37), Role-playing (N= 17) and Strategy (N=14).

From here several bivariate correlations were conducted using firstly Action/Adventure, then Role-playing, and finally Strategy participants. In Table 5 we can see the results for Action/Adventure participants, there was no significant correlation between virtual preference and any other measure which differs from the overall Gamer group which had a significant correlation with escapism and problem gaming. Also in Table 5, we can see the results for the Role-playing participants, which has a negative significant correlation with Age, r= -.62, p = .008, which is different to the overall Gamer group, and similar to the Action/Adventure participants the significant correlation with escape and problem gaming are no longer present. Also, in Table 5 we can see the results for the Strategy participants which

like the Action/Adventure group has no significant correlations. It was originally planned to conduct regression analysis and the groups but due to no significant correlations between virtual preference and gaming motivations, it was decided that a non-parametric test would be better suited. An Independent samples Kruskal Wallis test shows that there was a significant difference in the age distribution between the groups (p =.001), the distribution of problem gaming (p = .038), and the distribution of advancement (P=.047). However, there were no significant differences in the distribution of virtual preference and the other gaming motivations.

Table 5

Correlation between Virtual Preference and the other study variables for the Action/Adventure Group

	Virtual Preference Action/Adventure	Virtual preference Role-playing	Virtual preference Strategy
Gender	-.095	.122	-.214
Age	.219	-.617*	.015
Hours/Week	-.089	.141	.088
Gaming Session	.271	.037	.041
Advancement - MPOGQ	.119	.215	-.405
Mechanics - MPOGQ	.097	.178	.088
Competition - MPOGQ	-.156	.045	-.458
Socializing - MPOGQ	.100	.289	.011
Relationships - MPOGQ	.077	.228	.300
Teamwork - MPOGQ	-.070	.247	-.060
Discovery - MPOGQ	.148	.365	-.015
Roleplaying - MPOGQ	-.173	.388	.153
Customization - MPOGQ	.016	.315	-.015
Escapism - MPOGQ	.175	.256	.468
Contingent Self Worth	.-145	.240	.321
Problem Gaming	.310	.291	-.048
K10	-.014	.377	-.192

Note. Gender = males coded as 1, females as 2; Hours/week = how long a week participants spend playing video games; MPOGQ = Motivation to Play in Online Games Questionnaire; * p<.05; ** p<.005

3.4 Open-Ended Questions

A total of 27 participants from the Gamer group answer the optional question, ‘Do you think that you prefer video game visuals over real-life visuals? if so why?’. Which all 27 replied with ‘no’, but 17 of them showed a virtual preference from their AMP results.

4.0 Discussion

This study has found a significant difference between Gamers and Non-gamers virtual preference, and as such have found support for the first hypothesis. It also seems that escapism correlates positively with virtual preferences and through linear regression, we can see that escapism and problem gaming can significantly predict virtual preference which shows support for the second hypothesis. For the third hypothesis, the results are not as clear cut, when splitting the participants into separate groups we have a loss of significant correlations which shows a difference in correlations based on genre preference, but due to no significant correlation in other video game motivations, our third hypothesis is not supported.

This study sought to test whether Gamers preferred virtual stimuli over real-life stimuli and if this preference was significantly different to the preference of Non-gamers. This differs from the previous study in the area, where they only had Gamers to test the preference of (Deleuze et al., 2019). While Deleuze's study reported significant results, it is important to see if there is a difference between Gamers and Non-gamers. If there is no significant difference between the two groups, then the preference for virtual stimuli could be due to other forms of media and entertainment such as the increasing use of televisions and smart devices in household resulting in people having high exposure to virtual stimuli in their formative years. In the current study, a significant difference was found, it is likely that this virtual preference is something that comes from playing video games, and not something that develops from other forms of media that an individual partakes in, such as cartoons and similar shows. Even though there was a significant difference between the preferences of both groups, the Gamer group only showed a slight preference overall for virtual stimuli over real-life stimuli, but this still shows that Gamers prefer virtual stimuli over real-life stimuli. It is quite possible that this shows that usage of video games does not cause a large conditioning of individuals to prefer virtual stimuli and that its effect on individuals, while significant, is very minor meaning that other circumstances in the individual's life are more important in the forming dysfunctional gaming habits.

It could also show that due to the large and diverse nature of the group in question, that Gamers are more complex than originally thought and that the homogeneous approach to the group known as Gamers that have been used in past studies is limiting as each individual while sharing some characteristics have many other characteristics that make them hard to

put them into one group. It might even be possible that humans have an evolutionary disposition to certain real-life stimuli (Little, Jones, & DeBruine, 2011), which results in us having an overall preference for real-life stimuli, which is supported by Non-gamers having a much larger preference for real-life stimuli than Gamers have for virtual stimuli. This would mean that Gamers showing even a slight preference for virtual stimuli shows the effect that video games can have on a person's life. However, it is worth noting that the two groups used in this study had some significant differences from each other, firstly the distribution of gender was different with Non-gamers having a higher percentage of females than the Gamer group. Secondly, the Non-gamer group also had a significantly younger mean age when compared to the Gamer group. This could mean that the difference in the preference for stimuli could be a result of a difference in gender or age, not of being a Gamer or not, but it is less likely to be due to age as the difference between the groups mean age was only about 2 years which means that the participant most likely experience similar generational conditions in their formative years.

Escapism was significantly positively correlated to virtual preference, even though this effect was only a small to medium association it still showed that there is a positive relationship between virtual preference and escapism. At the same time, the measure of problem gaming also showed a very similar correlation with virtual preference when compared to escapism, which wasn't completely unexpected as previous literature has shown that escapism and problem gaming behaviours correlate consistently (Cade & Gates, 2017; Calleja, 2010; Reid, 2012). Even when controlling for each other in a set of partial correlation tests it was still found that the escapism and problem gaming were not significant with virtual preference. This shows that there is an overlap in variance explained with escapism and problem gaming, this could indicate that the relationship between escapism and problem gaming is too complex for these models. This overlap of variance could be indicative of the idea that problem gaming puts too much emphasis on the maladaptive properties of escapism and does not recognise the adaptive use of escapism. That is to say that Petry's IGD measure does not fully recognise the adaptive use of escapism for relieving stress, or even the necessary nature of escapism that is needed for any hobby or stress relief practice.

The complex nature of escapism has been talked about in the current literature, particularly how it has traditionally been seen as a maladaptive strategy that results in problem gaming behaviours, but escapism can be an adaptive relaxation and coping

mechanism taken by an individual (Deleuze et al., 2019). Deleuze has stated that the concept of escapism needs to be researched more to gain a better understanding of it and its relationship to problem gaming (Deleuze et al., 2019), and what has been found in this study supports this idea. It is possible that current measure of problem gaming is limited in their applications, for instance on the Petry's measure of problem gaming (Petry et al., 2014), it is possible that the weight that researchers put on each question is more than what individuals do. This is to say that some of the question, such as ones that ask if participants think about gaming when not playing games, is not a maladaptive behaviour that is indicative of dysfunctional tendencies that lead to problem gaming, and that it is more akin to the way people think about hobbies while bored at work or school. Or that when lying about playing games longer than what they report to friends and family, this lying could be in response to harsh or strict rules imposed on them and that it doesn't actually represent that the individual is indulging in games in such a way that it is heavily impacting other areas of their life.

The results from the current study have some inconsistencies with the findings of Deleuze, most notably in the fact that virtual preference was correlated with problem gaming, were in Deleuze's study no correlation was found with addiction (Deleuze et al., 2019). This result could be somewhat surprising to see as the current study used volunteers so it would be thought that the individuals that would score high on problem gaming would not opt into the study due to their addiction to video games or even due to fear of confrontation with their problem. However, due to problem gaming correlating with escapism it is not as surprising but does support the idea that the understanding of escapism in the current literature focuses too much on its maladaptive properties, or that escapism needs to be quantified better especially when being used in measures problem gaming.

A surprising result from the current study is that there was no significant correlation between virtual preference and hours spent gaming a week, or even how long the participants average gaming session was. This seems to indicate that once a person is a Gamer the amount of time they put into gaming is unrelated to their preference for virtual stimuli, this goes against the findings of previous AMP studies that have looked in to other areas such as alcohol usages (Payne et al., 2008; Payne et al., 2016), were participants preference for alcoholic visual stimuli was predictive of the individuals behaviour and alcohol usage. This difference in results could show that there is a great variance in the population of Gamers in the area of how much gaming is needed for them to satisfy their urges to play video games. It

could also show that time spent playing is not closely tied to dysfunctional behaviour with games. In recent iterations of problem gaming measures there has been less emphasis on time spent gaming, and the result from the current study does support that idea, that the amount of time spent playing is not a main part of problem gaming behaviour and that the reason why one plays games and the effect that it has on other aspects of the individual's life is more indicative of problem gaming. This difference could also show that the AMP has been implanted incorrectly in the current study and that is why virtual preference doesn't seem to correlate with increased usage of video games. It is also possible the dichotomous choice offered by this study is not fully representative of the choices an individual makes in reality and that perhaps a measure of inhibition could give greater insight into why we are not seeing a correlation of time spent gaming and a preference for virtual stimuli.

It is possible that the AMP may not be suitable for usage in this research field as many games that are currently on the market showcase how realistic their graphics are. For example, while this study used images from more stylised games such as 'Spyro' and 'Super Smash Bros Ultimate', it also included many games that try to be realistic as possible, such as 'Red Dead Redemption 2', 'FIFA 19' and 'NBK 2k19'. It is quite possible that the usage of the AMP could be influential in this field of research but due to the increase of graphics in modern video games, it becomes too difficult for individuals to separate reality and virtual stimuli in the short time frame that the stimuli appear. While increasing the time frame on the stimuli interval is acceptable (Payne & Lundberg, 2014) at a certain critical point the stimuli of interest will be visible for such a period that the participant will start making conscious decisions on their answers, and then the AMP will no longer be measuring implicit attitudes. While it could be possible to use older games, there is a possibility that nostalgia will act as a confounding variable (Hilgard et al., 2013). The other option is to use only games that do not try to emulate reality with high graphics, the only issue with this approach is that it will exclude a large number of Gamers who mainly look for or play these types of games, and it is possible that as time goes on more and more games will start to try and emulate reality as the technology get more powerful and widespread.

One of the open-ended question that was asked of the participants is if they believed that they preferred virtual stimuli over real-life stimuli, and out of the 27 people that responded to this optional question, all 27 said that they preferred real-life stimuli over virtual stimuli, which was not represented in the result from their AMP. This could possibly show

that the AMP does, in fact, work in this area of research to a certain degree and that Gamers are unaware of their implicit bias to virtual stimuli. Be that because they are genuinely unaware that they have this preference, or that they are repressing this bias due to social fears or are trying to answer in a way that they think is socially acceptable. Also the majority of responders to the optional questions all referenced in some way that they play video games for a sense of escape or freedom, this reflects on the idea that escapism is not necessarily maladaptive behaviours that lead to problem gaming, it could be adaptive relaxation strategies, as not all the responders scored high on the problem gaming measure.

Genre preference is still an area that needs more research as due to sample size issues the results from the current study are not clear. While there was a change in the subdomains of gaming motivations significance, it was only the loss of significant correlation with escapism, not a change in which motivations were significant as what was predicted at the start of the study. While this is most likely due to the sample size issue some information was gained by using non-parametric tests that showed that there was a difference between groups, however, the only different gaming motivation was that of advancement. While this study shows that there might be some relationship between genre preference and gaming motivation, due to issues with the sample size future research looking into genre preference is needed.

It is important to note that the definition of who is a Gamer was based upon how many hours a week the participant partook in playing video games but this could definition could be contested, seeing as only a small portion of people who play video games identify as Gamers, based upon the 10% of American adults view themselves as gamers while 49% play video games (Duggan, 2015), it could be argued that a Gamer has to be someone that views themselves as part of the Gamer in-group. However, splitting the participant by the amount they play is most likely the better course to take as due to Gamers holding a bad image in current society, many people that should be considered a Gamer could report themselves as a Non-gamer due to wanting to fit into a social norm.

4.1 Limitations

It is important to note that there are some areas in which this current study lacks in, the first one is the application of the AMP in an online setting. While the change of the display time of the images is considered alright following the AMP guidelines (Payne & Lundberg, 2014) the changes that were made in this study was quite large to the point where

the images might not be measuring implicit preference as the threshold for subliminal and consciousness is around 75ms but this can vary depending on the person (Ameqrane, Pouget, Wattiez, Carpenter, & Missal, 2014). Another issue with the implementation of the AMP is the programming language that was used, due to the nature of this programming language and the variance in participants computer and internet speed, participants could have possibly had the images show up for different amounts of time. This is to say that the images might have lasted for different time periods for each participant resulting in some of the participant making more conscious decisions and some participants not being able to see certain images at all. This limitation could be mitigated in future studies by using other more application-based programming languages such as Java as it will allow for greater control over the timing of the transition of images and be less dependent on computer and internet quality. This change will also allow for the transitions times to be shorter allowing for more images to be used in the same time period and possibly running the same images multiple times to control for paired learning.

There were also limitations in the setup of the study, namely the use of multiple websites. Multiple websites were utilised in this study because the website that hosted the survey, Survey Monkey, does not allow for any code injection into their website and this meant that a secondary website was required to allow for the AMP portion to be run. Due to time restraints, it was not viable to host the survey on the site that ran the AMP. In response to the issues with multiple websites and the general implementation of the AMP, an optional question asked the participants to report any issues they had with the AMP. This was included to remove any data that may be invalid due to the issues with individuals' computers and internet speeds that affected the display of the images. However, some individuals used this to comment on the AMP portion as a whole and some of the more interesting ones talked about how they rated everything as a 'like' because they felt that there was no real reason to dislike the neutral image. This may not be a limitation to the AMP but does raise some questions on what effect the participants responses on the AMP, and while it was shown in this study that depression doesn't seem to correlate with preference, it does seem that in some individuals their outlook on life and general mental state does affect their responses to the AMP, and that this area of the AMP might require more research to see if there is a real significant effect.

4.2 Future Research

While there are some interesting findings and questions raised by this study, it does seem that ultimately that the findings are of a more methodological nature as it raises more question about the implementation of the AMP into the research field of problem gaming and gaming motivations, and of the nature of escapism as it is currently seen in the current literature. Concerning the AMP, more research need to be done in regards to more stylised games such as 'Spyro' and 'Super Smash Bros Ultimate' and possible even older games by controlling for the effects of nostalgia in other ways, such as asking the participant about their history with the games that were used in the study. This will give a better insight into if the AMP can be useful in the research field despite the rise of realistic graphics that we are seeing in video games. Another avenue of research regarding this is to use images of gaming externals such as controllers and game discs, it is possible that these externals would be able to show a preference for gaming and gaming activities which could relate to gaming motivations and problem gaming while not being affected by the problem of realistic graphics. Also, research with larger sample sizes that allow for the separation of the participants into genre preference groups of suitable size is needed to address the relationship between individual characteristics and preference on gaming motivations. This would be able to test if the treatment of Gamers as one homogenous group is too limiting and could result in certain motivation seeming to be significant when in fact it could be due to sample of participants mainly being of one group of gamers.

Study into the difference of virtual preference between genders is also needed, while the Gamer group had a fairly even distribution of genders, the Non-gamer group was composed almost entirely of females and as such, this significant difference in preference could be due to gender and not that of Gamer and Non-gamer. Also, the inclusion of a non-optional direct measure of stimuli preference could shed some light on the implicit nature of the preference, as while this study found that the majority of people who responded to the optional question didn't believe they preferred virtual stimuli, they only represented ¼ of the total Gamer sample. A study that takes a more direct measure of the conscious stimuli preference would be able to show if the AMP shows the implicit attitudes of the participants.

Another field that requires more research is looking into the nature of escapism and how it is represented in the current literature. As noted by Deleuze, it seems that in the current literature the understanding of escapism varies from playing games to relax from real-

life problems in an adaptive way, all the way to being a diagnostic criterion for IGD (American Psychiatric Association, 2013; Deleuze et al, 2019). This suggests that the understanding of the nature of escapism is not clear in the current literature and future research is required in defining and understanding which parts of escapism maladaptive, and which parts are adaptive. Or it could suggest the problem gaming measurements are limited and escapism needs to be quantified by other action and variables to be a part of a problem gaming measurement. As it currently stands in the literature someone who uses video games as a coping strategy to deal with some issues in their life but at no detriment to other areas of their life can rate similar on current problem gaming measurements as someone who has dysfunctional behaviours when it comes to playing video games.

4.3 Conclusion

This study adds to the emerging research base that wrestles with measuring implicit bias and its correlation with problem gaming by showing that Gamers have a significant preference for virtual stimuli when compared to Non-gamers, but it's still not certain why the preference exists. It is possible that this difference could be due to the difference in gender difference. Virtual preference does correlate with both escapism and problem gaming but the nature of realistic graphics and nostalgia calls into question if the AMP is suited to be used in the research area of video games. When splitting the Gamers into smaller groups based on their genre preference no new significant results were found, however, the groups were not of suitable size after being split. The correlation between virtual preference and escapism was expected based on the findings from Deleuze's study (Deleuze et al., 2019), and shows that the AMP might provide an experimental avenue of research for videogame research. However, future research is required to make refinements to the AMP and its implementation into videogame research, namely the issue with realistic graphics and its possibility of being indistinguishable for real-life stimuli, in the short time frame it is shown. Also, some further research into the relationship between gender and virtual preference, along with the relationship between genre preference and gaming motivations, is needed.

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